1 2	3	4	5	6	7	8
23 Sikkim	39.50	39.57	90.75	89.13	36.40	24.04
24 Tamil Nadu	1294.81	1002.61	1255.53	126127	1362.36	1304.64
25 Tripura	53.87	31.65	43.69	21.32	5234	4226
26 Utter Pradesh	965.83	1037.97	835.78	859.38	710.09	950.00
27 Uttarakhand	310.67	118.74	253.84	285.38	327.77	408.41
26 West Bengal	1222.74	652.02	1567.48	1560.20	2078.55	1774.51
TOTAL (STATES)	14635.	16027.33	17954.46	16309.43	18071.36	16998.11

Status of Gas based power projects

†674. SHRI JAI PARKASH AGGARWAL: Will the Minister of POWER be pleased to state:

(a) the details of proposals of gas based power projects pending with Government;

(b) the dates on which these proposals were received by Government;

(c) the reasons for delay in sanctioning these projects; and

(d) the reaction of Government thereto?

THE MINISTER OF POWER (SHRI SUSHILKUMAR SHINDE): (a) No, Sir.

(b) to (d) Do not arise.

Shut down period of power plants

675. SHRI VIJAY J. DARDA: Will the Minister of POWER be pleased to state:

(a) the annual shut down period of our power plants and whether the periodicity/duration compares well with world acceptable norms;

(b) if so, whether through R & D in energy sector, covering all aspects, duration of shut down will be reduced, making it cost-effective and time-effective;

†Original notice of the question was received in Hindi.

(c) whether Government have appointed any consultants, foreign or domestic, to advise on shut-down duration or periodicity etc. during the last five years; and

(d) if so, the details thereof?

THE MINISTER OF POWER (SHRI SUSHILKUMAR SHINDE): (a) Annual shut down period of thermal (coal/lignite) and hydro power plants in the country during the year 2005-06 are given below:

Category	Planned Maintenance (%)	Forced Outage (%)	Total (%)
Thermals	9.48	8.74	18.22
Hydro	7.45	3.31	10.76

- The norms followed for annual overhaul period of thermal power stations (as recommended by the Kukde Committee) are:
  - * 200/210.500 MW Units :Average 28 days/year (5/6 years Rolling Plan).
  - * Less than 200 MW Units: Average 33 days/year (5/6 years Rolling Plan).

An indicative planned maintenance.data of fossil fuel based power plants in North America (Canada and USA) and Japan, as available in the report of World Energy Council, is given below:

Country	Plant size. (MW)	Planned Maintenance (%) 2000	2001	2002
North America	100-199	7.1	7.0	6.6
(Canada & USA)	200-299	6.9	8.1	4.1
	400-599	5.5	7.5	6.3
Japan	300-399	17.7	8.7	21.1
	400-599	14.6	16.6	13.5

However, comparison of planned maintenance data of Thermal Plants in India with above would not be justified in view of high ash content in Indian coal and'abrasive nature of ash which entials more plant maintenance.

Annual shut-down period of hydro plants for planned maintenance is of 30 days. World-wide acceptable norms for annual maintenance of hydro units are not available.

Average annual shut-down period of Nuclear Power Plants in India is about 20 days and it compares well with the international standards in this regard;

(b) The following R& D measures in energy sector have been initiated to reduce the duration of shut-down period of power plants.

In case of Hydro Power Station, R&D on Silt Erosion Resistant Material for Turbines of Hydro-generators has been undertaken under National Perspective Plan for R&O in Power Sector. Developments of such a material would reduce the power plant breakdown (unscheduled outage).

In case of Thermal Power Plant initiatives on technologies for increasing the availability and reliability of stations and adopt latest non-destructive technologies (NDT) to enable faster and better decisions on run/repair/ replace to the stations through risk/knowledge based technologies have been adopted. These measures will help the stations in moving from periodic overhaul regime to knowledge based inspection/overhaul regime and thus help in increasing the periodicity between overhauls.

Besides these, condition based monitoring, improved O&M practices and better resource mobilization during maintenance overhauling would help in reducing duration and periodicity of shut-down of power plant to some extent.

(c) and (d) A Working Group was set up by the Ministry of Power, Govt, of India, in February, 2000 under the Chairmanship of Shri P.K. Kukde, Technical Director (Generation), MSEB to review the norms for Planned Maintenance Period for Boiler and Turbo-generator sets as specified in the Report of the Committee of Maintenance Procedure in large Thermal Power Stations' (Srinivasan Committee set up by Government of India in February, 1985) and also to set the latest norms for Planned Maintenance of Thermal Power Plant Equipment.

The Working Group in its Report, submitted in March, 2001, had concluded that it should be possible to reduce the maintenance outage period of boiler and turbo-generator by creating separate Maintenance Management Cell at Station level. The Working Group had, *inter-alia* recommended Five/Six year Rolling Plan for Coal/Lignite based stations

with an average annual outage of about 28 days for units 200/210/250/500 MW as against 51 days for 210 MW and 63 days/unit/year for 500 MW followed earlier which would lead to saving of down time of 23 days/unit/ year for 200/210/250 MW units and 35 days/units/year for 500 MW. The average overhaul period 33 days/year has been recommended by the Kukde Committee for units of less than 200 MW.

Utilization of power generation capacity

676. SHRI SITARAM YECHURY: Will the Minister of **POWER** be pleased to state:

(a) whether it is a fact that Government are not in a position to utilize fully the installed capacity in power generation;

(b) if so, the reasons therefor; and

(c) the details of variation in utilizing the complete installed **capacity in** public sector and private sector?

THE MINISTER OF POWER (SHRI SUSHILKUMAR SHINDE): (a) to (c) the utilization of installed capacity of a generating unit is linked to the type of generation. While the thermal units are meant to be utilized continuously as based load units, hydro units are to be utilized depending on availability of water/reservoir level. Thus, utilization of installed capacity is effectively applicable to thermal (including nuclear) generating units and is expressed in terms of Plant Load Factor (PLF). The PLF of thermal and nuclear units depends on a number of factors such as vintage of the unit, forced and planned outages, availability of required quality and quantity of fuel, etc. Indicator for performance of hydro generating units is its availability (excluding the time required for its planned maintenance and attending to forced outages) and actual energy generation *vis-a-vis* design energy.

Sector-wise details of utilization of Thermal and Nuclear Power plants in terms of PLF and availability of machines and generation with respect to their Design Energy for hydro projects for the year 2005-06 are given below: